FIG.1

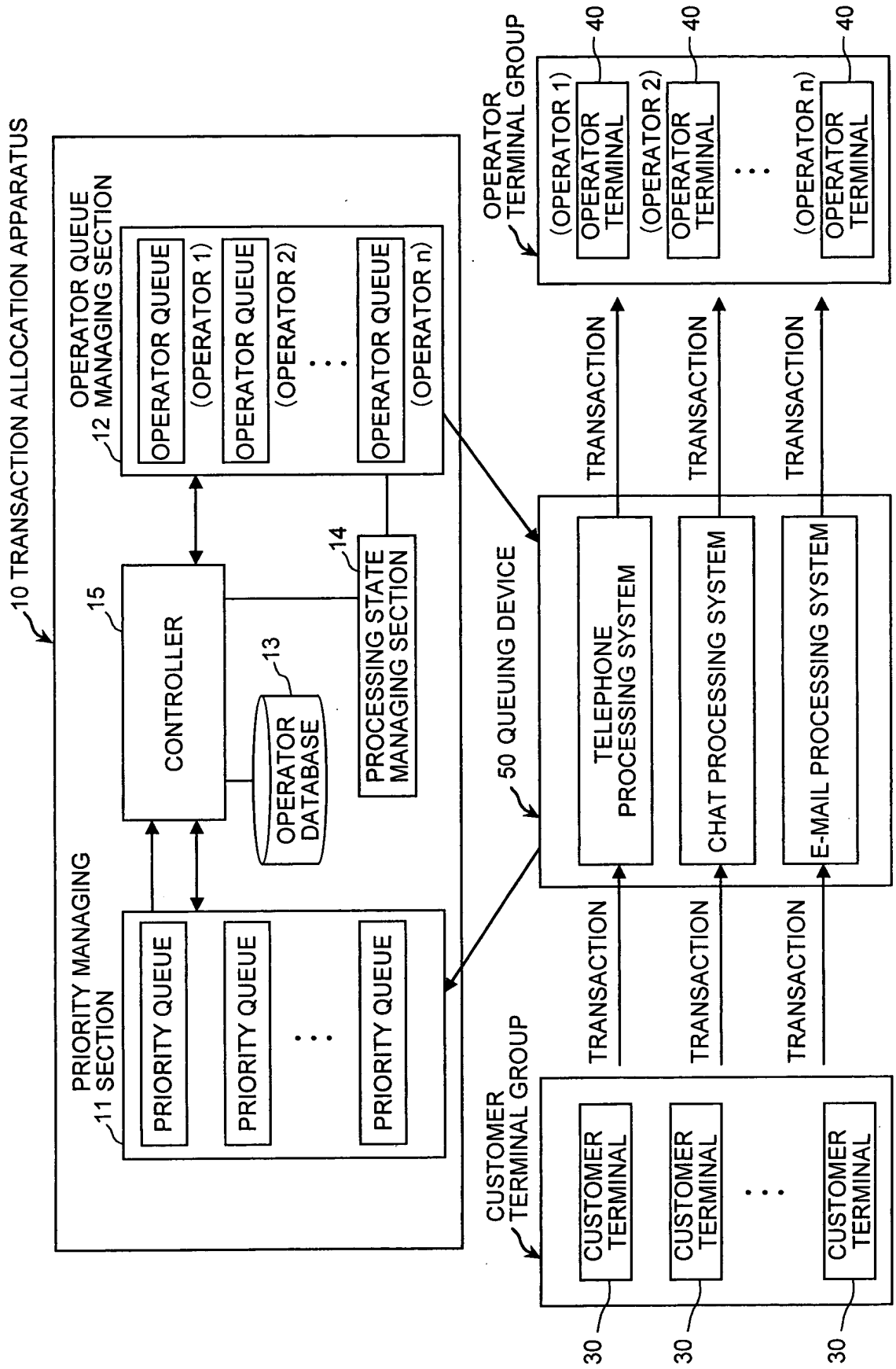

10 TRANSACTION ALLOCATION APPARATUS
OPERATOR QUEUE MANAGING SECTION
12
OPERATOR QUEUE (OPERATOR 1)
OPERATOR QUEUE (OPERATOR 2)
OPERATOR QUEUE (OPERATOR n)
CONTROLLER
15
PROCESSING STATE MANAGING SECTION
14
OPERATOR DATABASE
13
PRIORITY MANAGING SECTION
11
PRIORITY QUEUE
PRIORITY QUEUE
PRIORITY QUEUE
OPERATOR TERMINAL GROUP
(OPERATOR 1)
(OPERATOR 2)
(OPERATOR n)
OPERATOR TERMINAL
OPERATOR TERMINAL
OPERATOR TERMINAL
40
40
40
TRANSACTION
TRANSACTION
TRANSACTION
50 QUEUING DEVICE
TELEPHONE PROCESSING SYSTEM
CHAT PROCESSING SYSTEM
E-MAIL PROCESSING SYSTEM
TRANSACTION
TRANSACTION
TRANSACTION
CUSTOMER TERMINAL GROUP
CUSTOMER TERMINAL
CUSTOMER TERMINAL
CUSTOMER TERMINAL
30
30
30

FIG.2

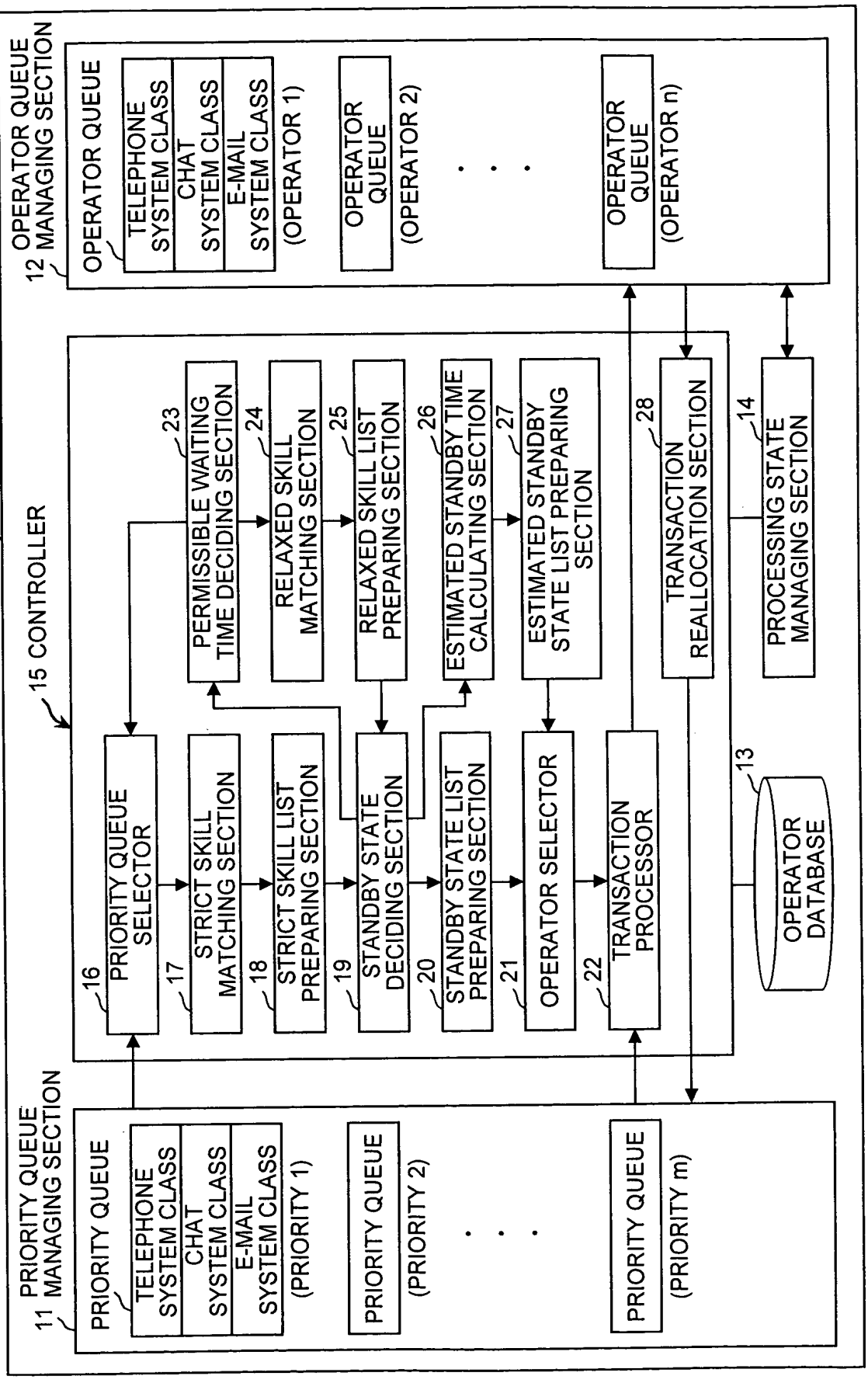

10 TRANSACTION ALLOCATION APPARATUS
11 PRIORITY QUEUE MANAGING SECTION
PRIORITY QUEUE
TELEPHONE SYSTEM CLASS
CHAT SYSTEM CLASS
E-MAIL SYSTEM CLASS
(PRIORITY 1)
PRIORITY QUEUE
(PRIORITY 2)
PRIORITY QUEUE
(PRIORITY m)
12 OPERATOR QUEUE MANAGING SECTION
OPERATOR QUEUE
TELEPHONE SYSTEM CLASS
CHAT SYSTEM CLASS
E-MAIL SYSTEM CLASS
(OPERATOR 1)
OPERATOR QUEUE
(OPERATOR 2)
OPERATOR QUEUE
(OPERATOR n)
15 CONTROLLER
16 PRIORITY QUEUE SELECTOR
17 STRICT SKILL MATCHING SECTION
18 STRICT SKILL LIST PREPARING SECTION
19 STANDBY STATE DECIDING SECTION
20 STANDBY STATE LIST PREPARING SECTION
21 OPERATOR SELECTOR
22 TRANSACTION PROCESSOR
23 PERMISSIBLE WAITING TIME DECIDING SECTION
24 RELAXED SKILL MATCHING SECTION
25 RELAXED SKILL LIST PREPARING SECTION
26 ESTIMATED STANDBY TIME CALCULATING SECTION
27 ESTIMATED STANDBY STATE LIST PREPARING SECTION
28 TRANSACTION REALLOCATION SECTION
13 OPERATOR DATABASE
14 PROCESSING STATE MANAGING SECTION

FIG.3A

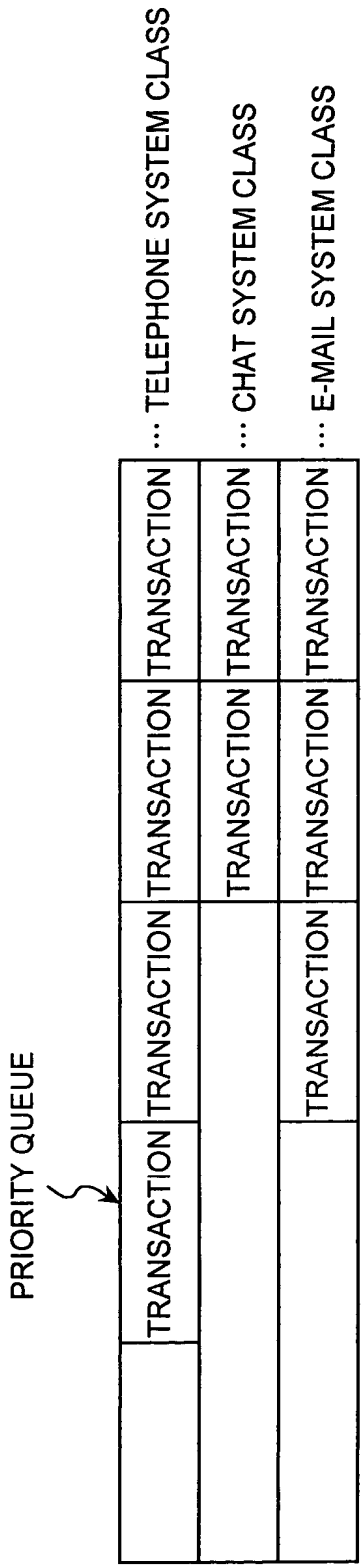

PRIORITY QUEUE
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
TRANSACTION
... TELEPHONE SYSTEM CLASS
... CHAT SYSTEM CLASS
... E-MAIL SYSTEM CLASS

FIG.3B

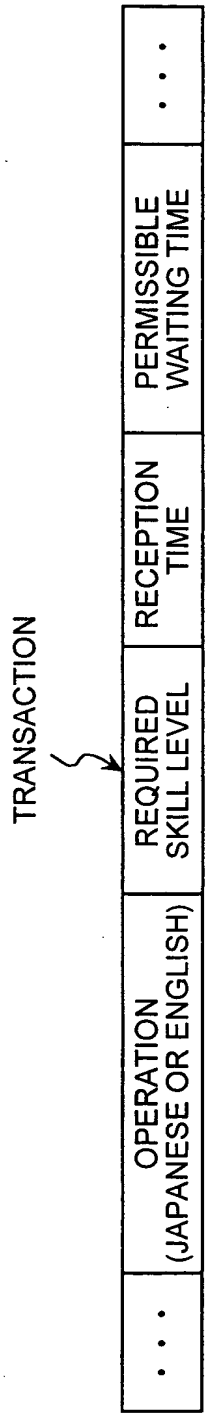

TRANSACTION
OPERATION (JAPANESE OR ENGLISH)
REQUIRED SKILL LEVEL
RECEPTION TIME
PERMISSIBLE WAITING TIME
. . .
. . .

FIG.4A

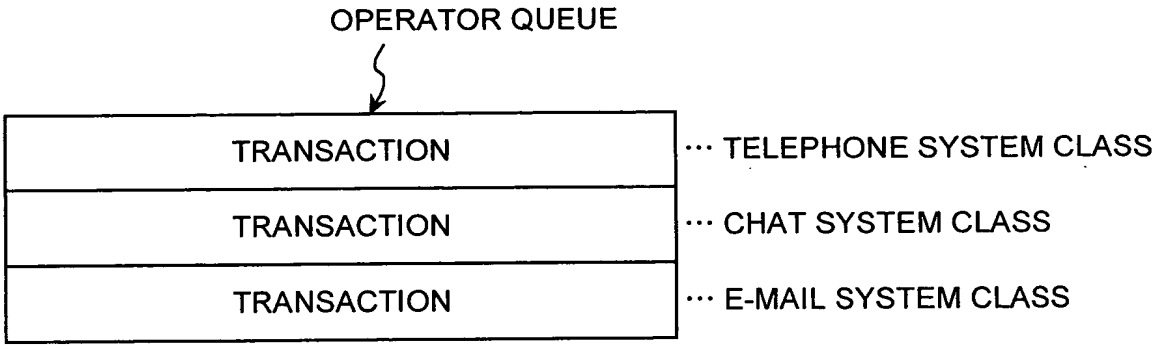



FIG.4B

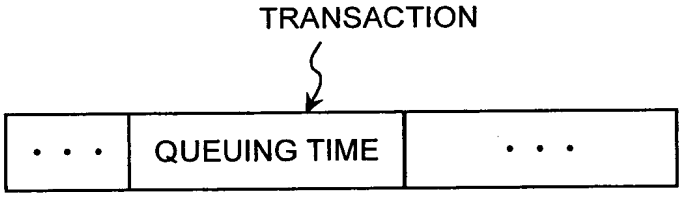
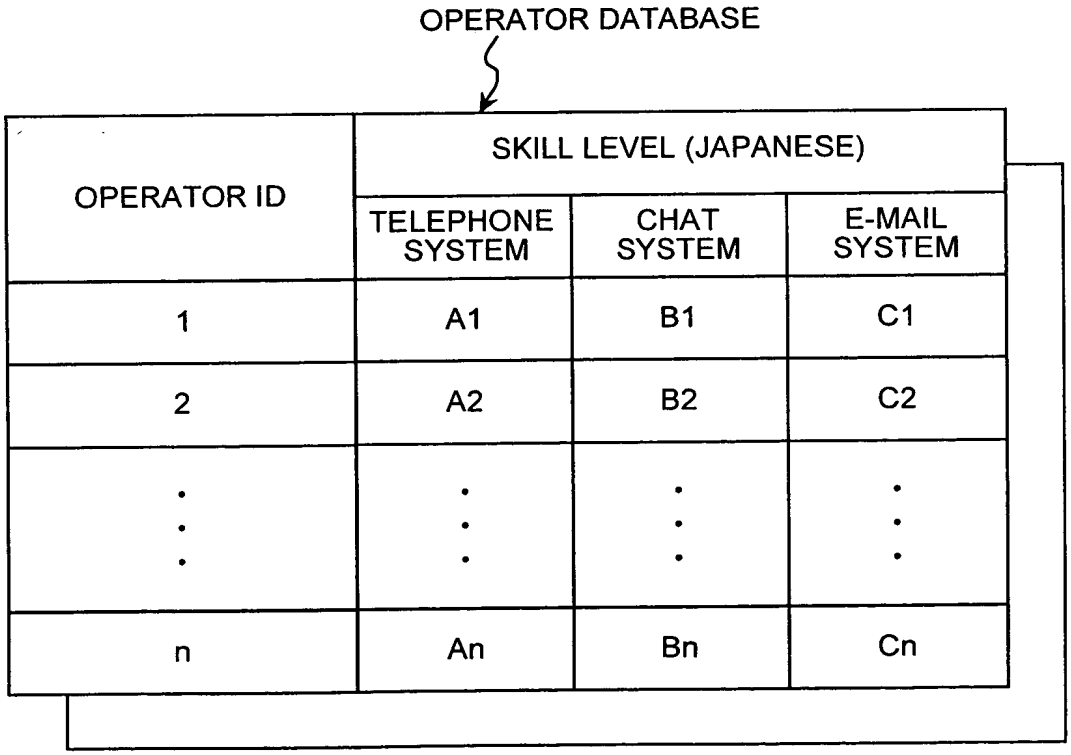



FIG.5




| OPERATOR ID | SKILL LEVEL (JAPANESE) | | |
|---|---|---|---|
| | TELEPHONE SYSTEM | CHAT SYSTEM | E-MAIL SYSTEM |
| 1 | A1 | B1 | C1 |
| 2 | A2 | B2 | C2 |
| • • • | • • • | • • • | • • • |
| n | An | Bn | Cn |

FIG.6

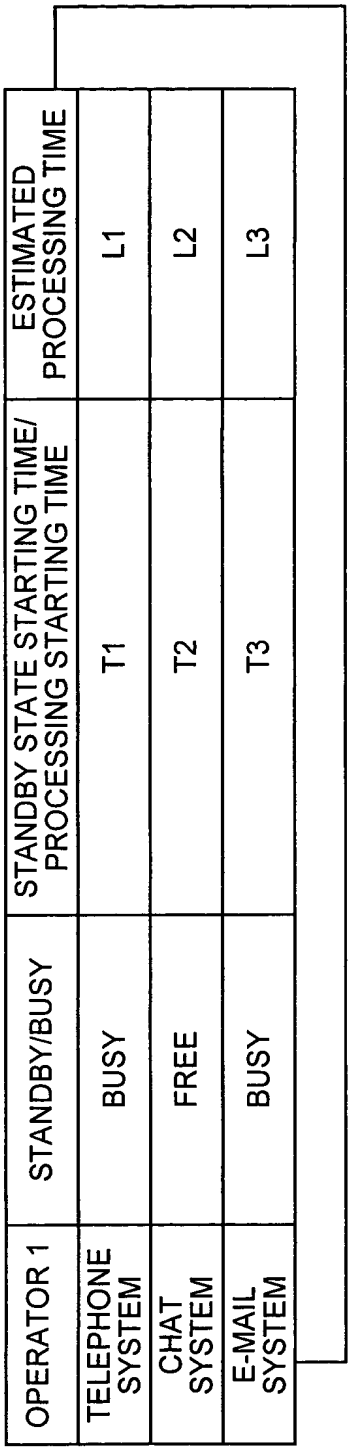

OPERATOR 1
STANDBY/BUSY
STANDBY STATE STARTING TIME/ PROCESSING STARTING TIME
ESTIMATED PROCESSING TIME
TELEPHONE SYSTEM
BUSY
T1
L1
CHAT SYSTEM
FREE
T2
L2
E-MAIL SYSTEM
BUSY
T3
L3

FIG.7

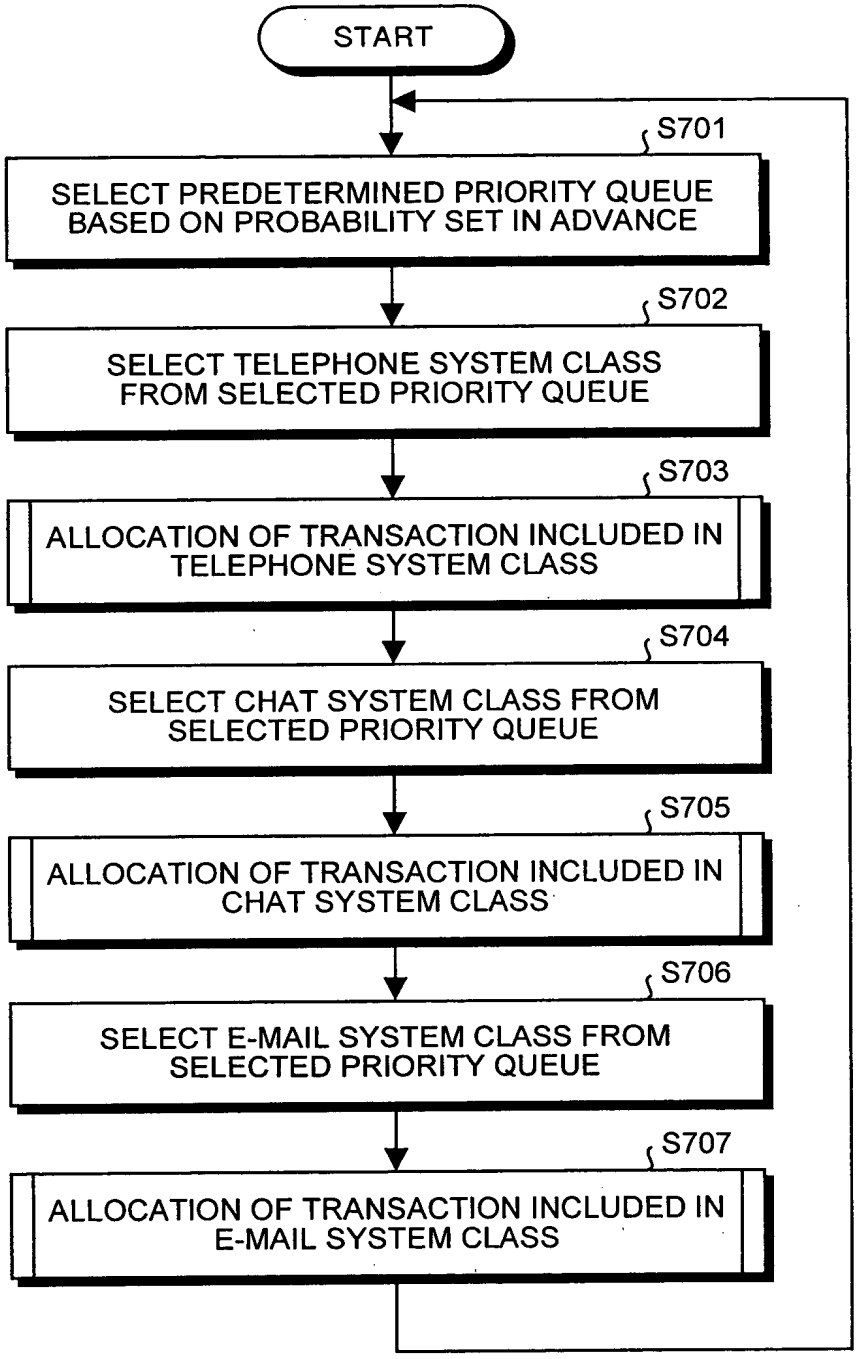

START
S701
SELECT PREDETERMINED PRIORITY QUEUE BASED ON PROBABILITY SET IN ADVANCE
S702
SELECT TELEPHONE SYSTEM CLASS FROM SELECTED PRIORITY QUEUE
S703
ALLOCATION OF TRANSACTION INCLUDED IN TELEPHONE SYSTEM CLASS
S704
SELECT CHAT SYSTEM CLASS FROM SELECTED PRIORITY QUEUE
S705
ALLOCATION OF TRANSACTION INCLUDED IN CHAT SYSTEM CLASS
S706
SELECT E-MAIL SYSTEM CLASS FROM SELECTED PRIORITY QUEUE
S707
ALLOCATION OF TRANSACTION INCLUDED IN E-MAIL SYSTEM CLASS

FIG.8

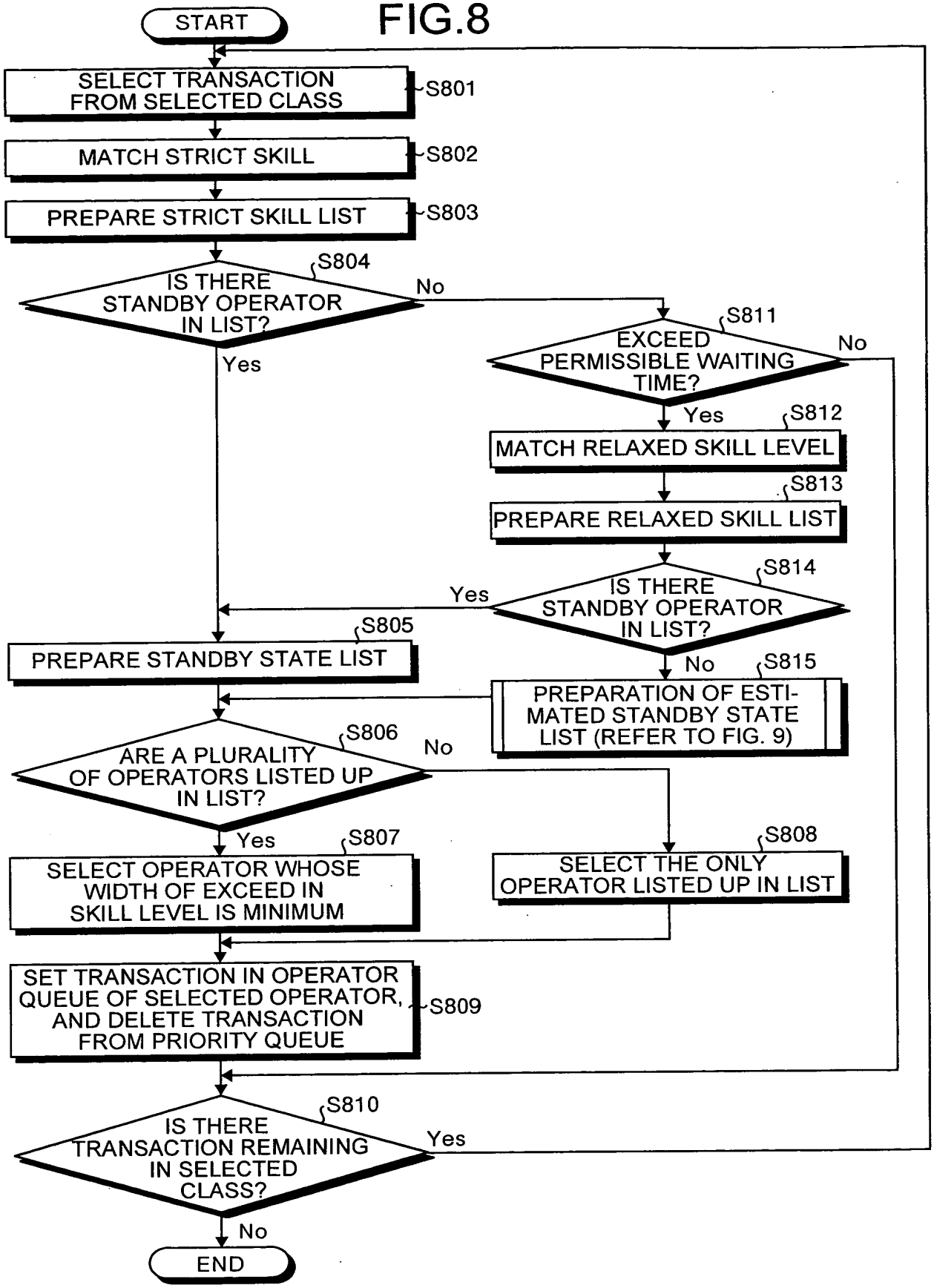
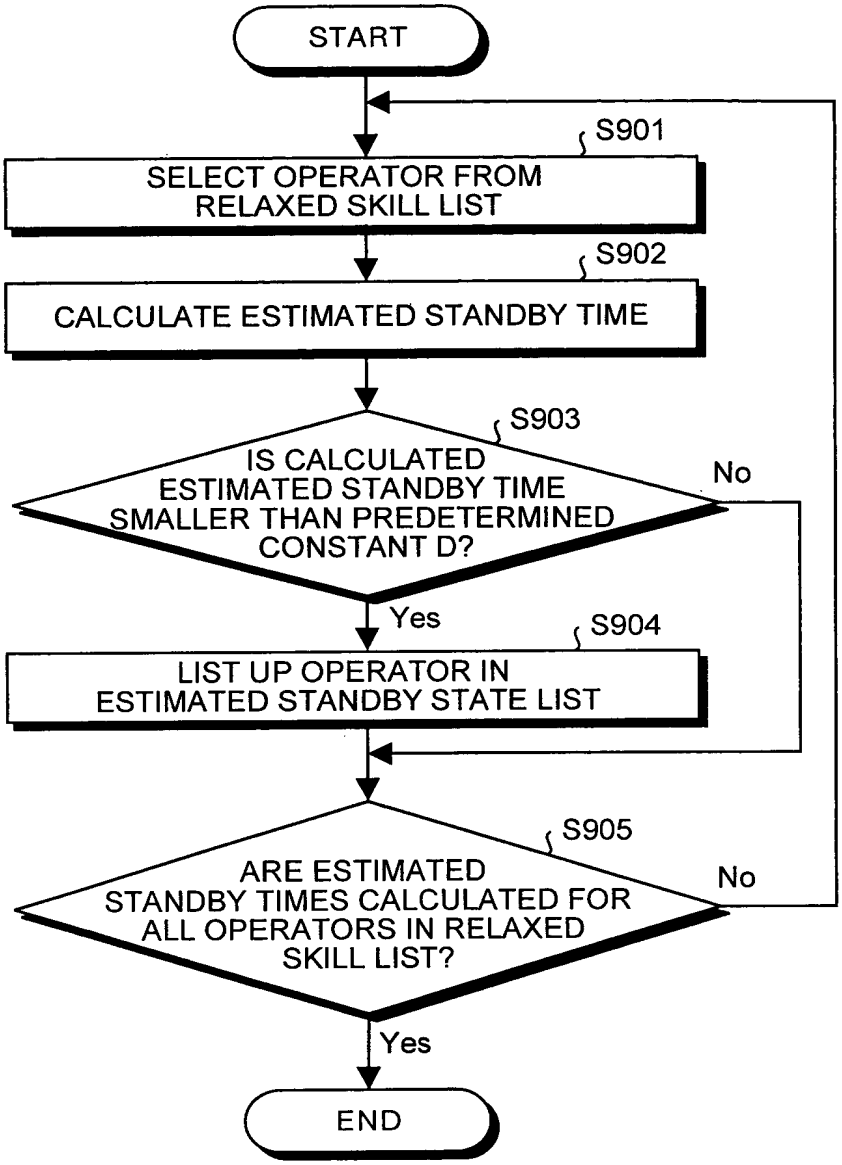
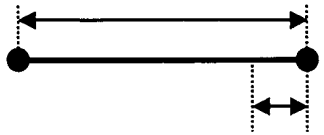

START
SELECT TRANSACTION FROM SELECTED CLASS
S801
MATCH STRICT SKILL
S802
PREPARE STRICT SKILL LIST
S803
S804
IS THERE STANDBY OPERATOR IN LIST?
No
Yes
S811
EXCEED PERMISSIBLE WAITING TIME?
No
Yes
S812
MATCH RELAXED SKILL LEVEL
S813
PREPARE RELAXED SKILL LIST
S814
IS THERE STANDBY OPERATOR IN LIST?
Yes
No
S805
PREPARE STANDBY STATE LIST
S815
PREPARATION OF ESTIMATED STANDBY STATE LIST (REFER TO FIG. 9)
S806
ARE A PLURALITY OF OPERATORS LISTED UP IN LIST?
No
Yes
S807
SELECT OPERATOR WHOSE WIDTH OF EXCEED IN SKILL LEVEL IS MINIMUM
S808
SELECT THE ONLY OPERATOR LISTED UP IN LIST
SET TRANSACTION IN OPERATOR QUEUE OF SELECTED OPERATOR, AND DELETE TRANSACTION FROM PRIORITY QUEUE
S809
S810
IS THERE TRANSACTION REMAINING IN SELECTED CLASS?
Yes
No
END

FIG.9


START
S901
SELECT OPERATOR FROM RELAXED SKILL LIST
S902
CALCULATE ESTIMATED STANDBY TIME
S903
IS CALCULATED ESTIMATED STANDBY TIME SMALLER THAN PREDETERMINED CONSTANT D?
No
Yes
S904
LIST UP OPERATOR IN ESTIMATED STANDBY STATE LIST
S905
ARE ESTIMATED STANDBY TIMES CALCULATED FOR ALL OPERATORS IN RELAXED SKILL LIST?
No
Yes
END

# FIG.10

ESTIMATED PROCESSING TIME THAT CERTAIN OPERATOR HAS RECENTLY TAKEN TO PROCESS TRANSACTION OF CERTAIN CLASS IS DEFINED AS L



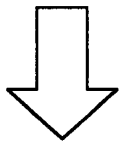
CONSTANT D

- THE PROBABILITY THAT THE ESTIMATED STANDBY TIME OF THIS OPERATOR IS NOT MORE THAN CONSTANT D BECOMES D/L WHEN OPERATOR IS CURRENTLY PROCESSING CERTAIN TRANSACTION
- NUMBER OF TIMES WHEN THIS OPERATOR HAS RECENTLY PROCESSED TRANSACTIONS = NUMBER OF OPPORTUNITIES WHEN TRANSACTIONS ARE ALLOCATED TO THIS OPERATOR (WHICH IS SAME NUMBER FOR ALL OPERATORS IN SAME GROUP) * D/L
- TOTAL PROCESSING TIME WHEN THIS OPERATOR HAS RECENTLY PROCESSED TRANSACTIONS

  = ESTIMATED PROCESSING TIME WHEN OPERATOR HAS RECENTLY TAKEN TO PROCESS TRANSACTION * NUMBER OF TIMES WHEN THIS OPERATOR HAS RECENTLY PROCESSED TRANSACTIONS

  = L * NUMBER OF OPPORTUNITIES WHEN TRANSACTIONS ARE ALLOCATED TO OPERATOR * D/L

  = NUMBER OF OPPORTUNITIES WHEN TRANSACTIONS ARE ALLOCATED TO OPERATOR * D



BY ALLOCATING TRANSACTIONS WHEN ESTIMATED STANDBY TIME IS NOT MORE THAN D, NUMBER OF TIMES WHEN TRANSACTIONS ARE PROCESSED BECOMES PROPORTIONAL TO D/L. THEREFORE, FEEDBACK IS APPLIED SUCH THAT TOTAL PROCESSING TIME TAKEN TO PROCESS TRANSACTIONS BECOMES SUBSTANTIALLY SAME FOR ALL OPERATORS IN SAME GROUP REGARDLESS OF VARIATION IN ESTIMATED PROCESSING TIME.

FIG.11

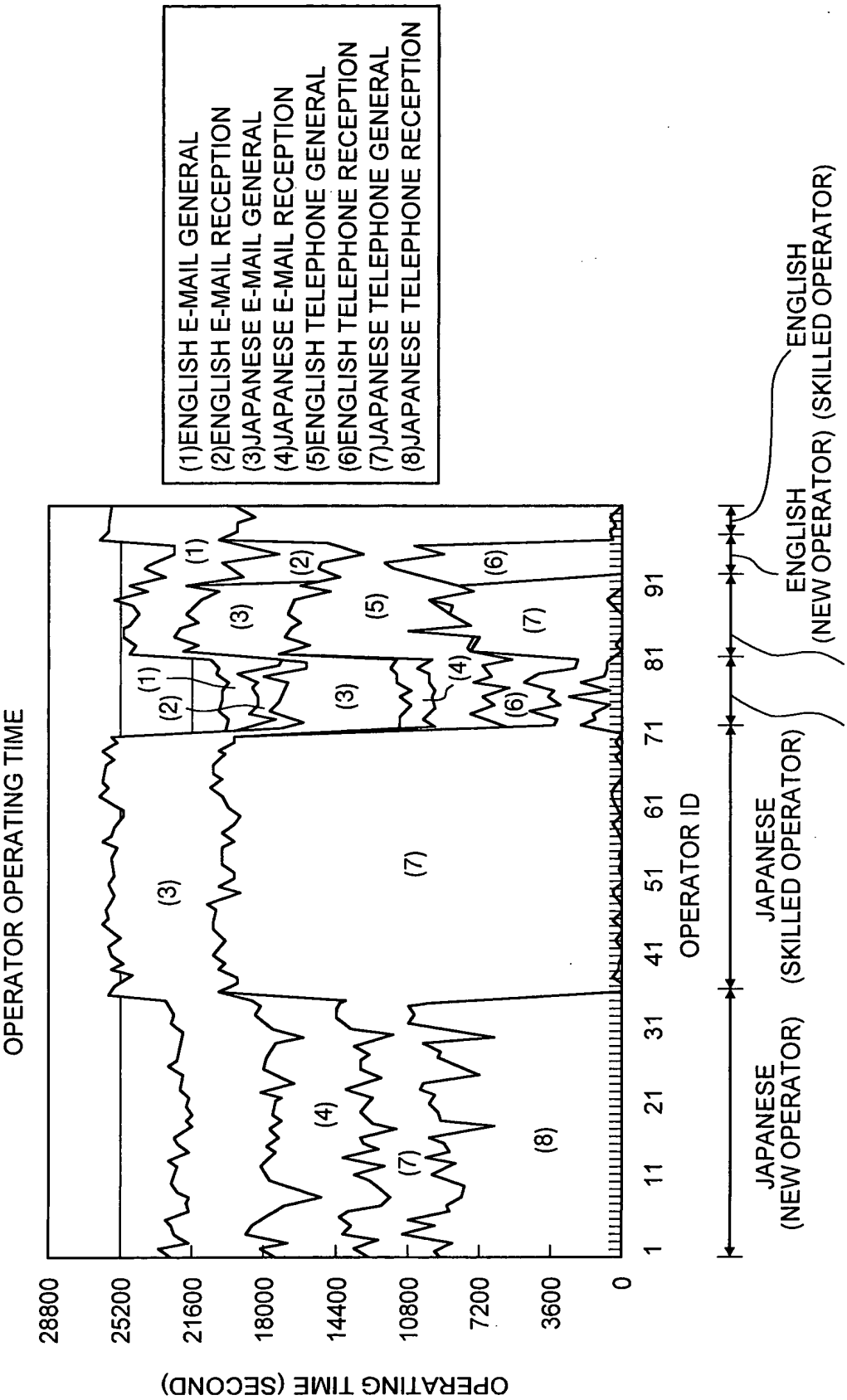

OPERATOR OPERATING TIME
OPERATING TIME (SECOND)
28800
25200
21600
18000
14400
10800
7200
3600
0
1
11
21
31
41
51
61
71
81
91
OPERATOR ID
(1)ENGLISH E-MAIL GENERAL
(2)ENGLISH E-MAIL RECEPTION
(3)JAPANESE E-MAIL GENERAL
(4)JAPANESE E-MAIL RECEPTION
(5)ENGLISH TELEPHONE GENERAL
(6)ENGLISH TELEPHONE RECEPTION
(7)JAPANESE TELEPHONE GENERAL
(8)JAPANESE TELEPHONE RECEPTION
JAPANESE (NEW OPERATOR)
JAPANESE (SKILLED OPERATOR)
JAPANESE & ENGLISH (NEW OPERATOR)
JAPANESE & ENGLISH (SKILLED OPERATOR)
ENGLISH (NEW OPERATOR)
ENGLISH (SKILLED OPERATOR)

FIG.12

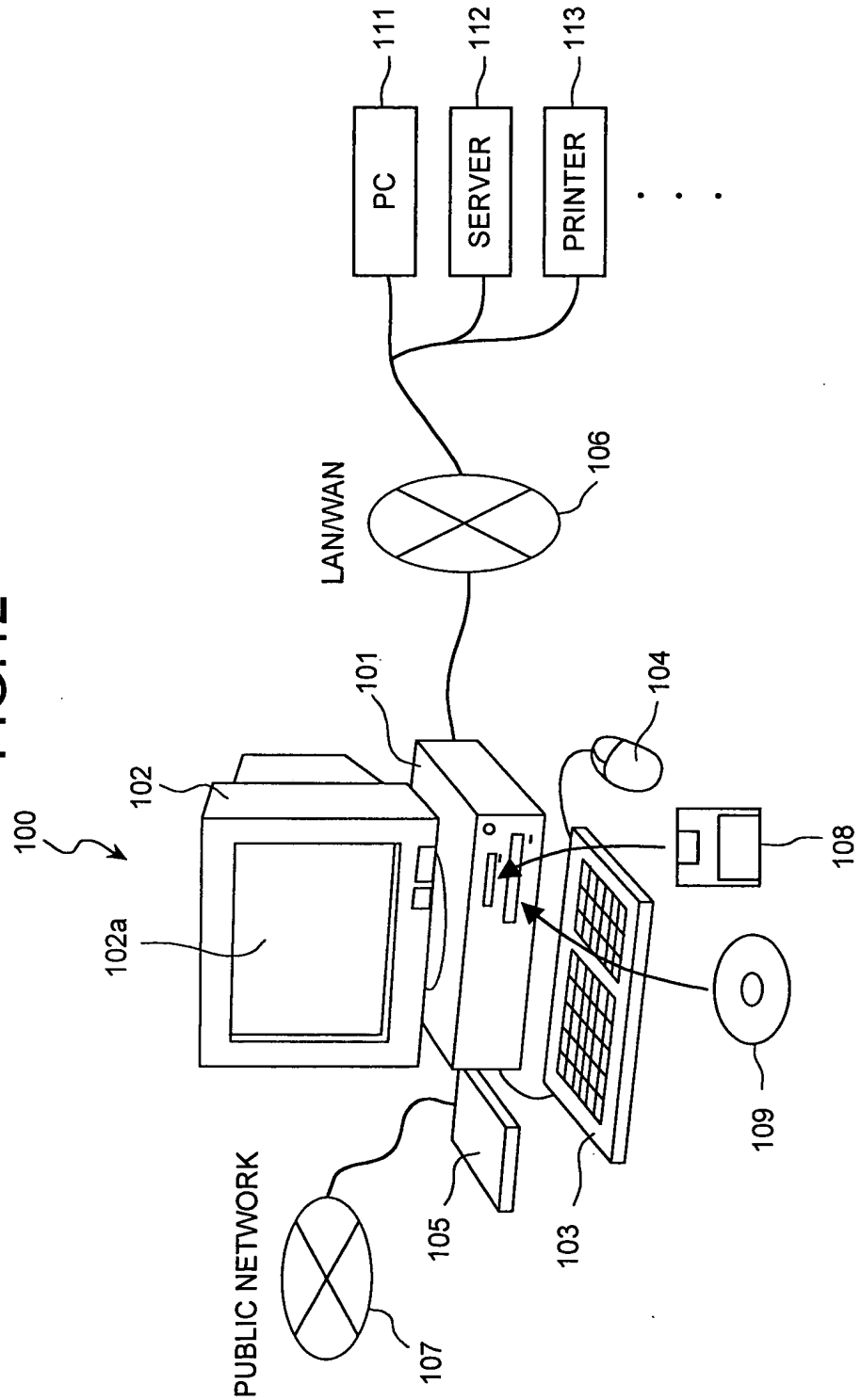

111
112
113
PC
SERVER
PRINTER
LAN/WAN
106
101
104
102
100
108
102a
109
PUBLIC NETWORK
105
103
107

FIG.13

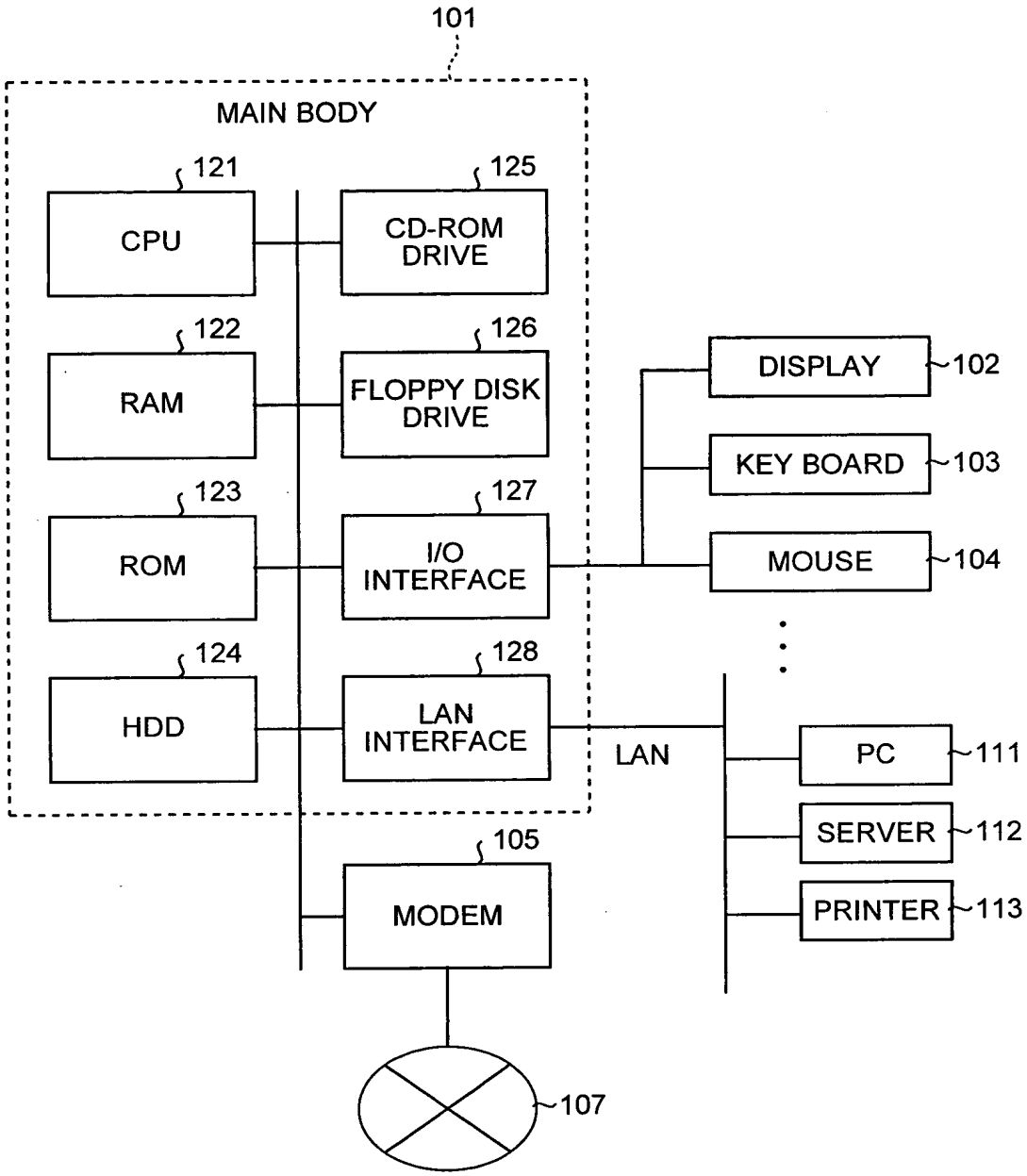
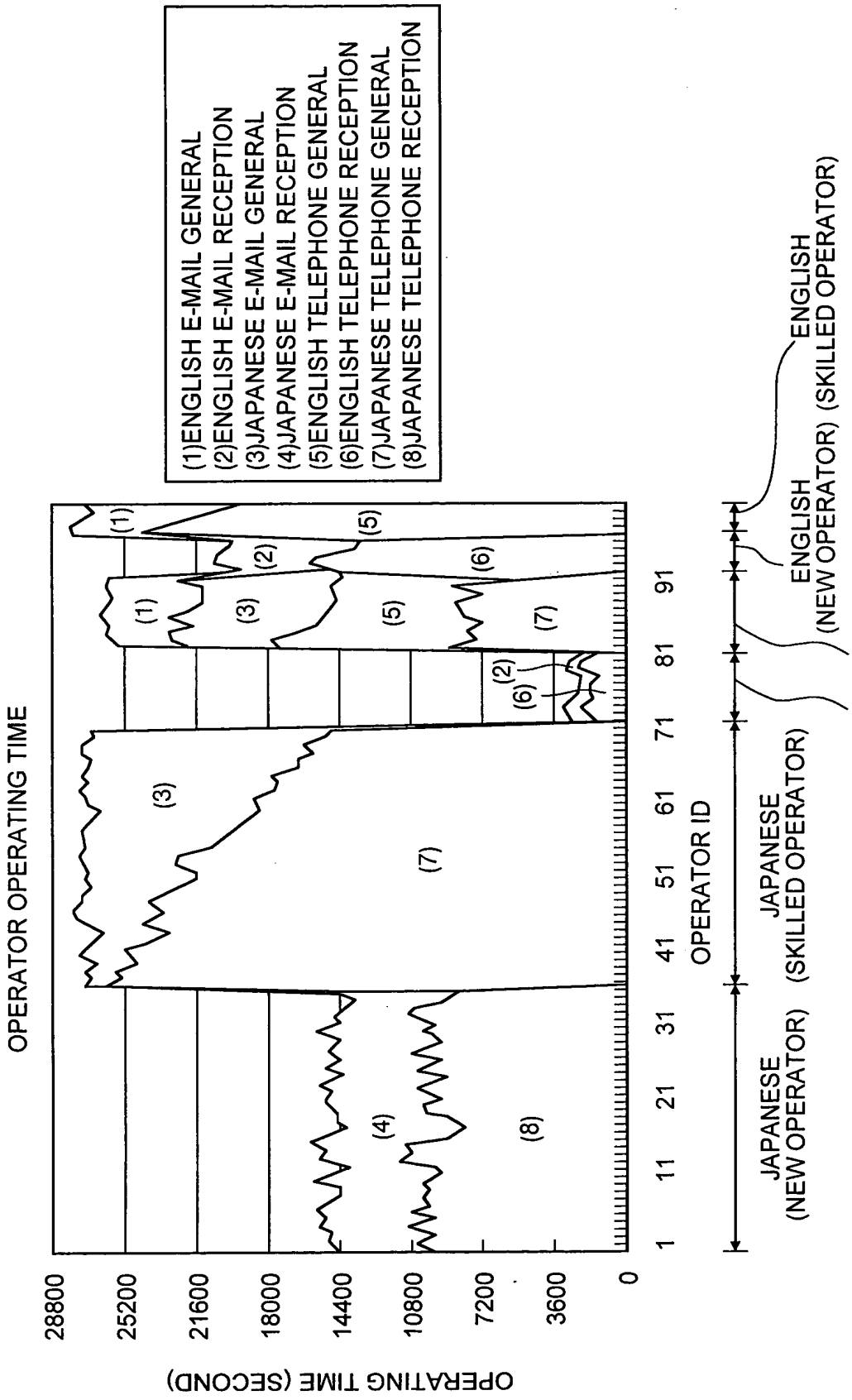

101
MAIN BODY
121
CPU
125
CD-ROM DRIVE
122
RAM
126
FLOPPY DISK DRIVE
123
ROM
127
I/O INTERFACE
124
HDD
128
LAN INTERFACE
105
MODEM
107
DISPLAY
102
KEY BOARD
103
MOUSE
104
LAN
PC
111
SERVER
112
PRINTER
113

FIG.14


(1)ENGLISH E-MAIL GENERAL
(2)ENGLISH E-MAIL RECEPTION
(3)JAPANESE E-MAIL GENERAL
(4)JAPANESE E-MAIL RECEPTION
(5)ENGLISH TELEPHONE GENERAL
(6)ENGLISH TELEPHONE RECEPTION
(7)JAPANESE TELEPHONE GENERAL
(8)JAPANESE TELEPHONE RECEPTION
OPERATOR OPERATING TIME
OPERATING TIME (SECOND)
28800
25200
21600
18000
14400
10800
7200
3600
0
1
11
21
31
41
51
61
71
81
91
OPERATOR ID
JAPANESE (NEW OPERATOR)
JAPANESE (SKILLED OPERATOR)
JAPANESE & ENGLISH (NEW OPERATOR)
JAPANESE & ENGLISH (SKILLED OPERATOR)
ENGLISH (NEW OPERATOR)
ENGLISH (SKILLED OPERATOR)